

passed its first stage of complete suspension of killing, but it will go on for nine further years adding 4,000 unnecessary reserve bulls annually.

The harmful effect of this abnormal state of affairs is already beginning to be evident. Preliminary information regarding the conditions found in 1916 show a total of 3,500 harems on the Pribilof Island rookeries. In other words, while there has been a gain of about 25 per cent. in the stock of breeding females since 1912, there has been a gain of about 150 per cent. in breeding males. This is due to the pressure of idle bulls upon the breeding herd. The increase in this class of animals since 1912 is 2,280 per cent. These animals crowd into the massed rookery portions and establish small harems by capture, and their attempts to hold and augment these harems keep the breeding grounds in a constant turmoil to the injury of the mother seals and the trampling of their young. This condition will grow steadily worse as the young males now being released from killing grow to maturity.

More important still is the obscurity which this increasingly abnormal condition will throw over the vital facts of the herd—its normal rate of increase and the proper proportion of male life—which a prolongation of the normal condition of the last six or eight years, throughout the early stages of the herd's recuperation, would have cleared up. On this subject I may quote the following paragraph from my report to the Bureau of Fisheries in 1913:

Unfortunately, if the suspension of land killing is prolonged, the balance will be broken. The herd will begin at once to enter upon a new era of abnormal conditions (like those of 1896-97). The pressure of the idle bulls will increase the number of harems without reference to increase in cows and the averages (resulting from the counts of pups) will become useless. The mortality among the cows and pups will increase frightfully, retarding the development of the herd. The work of rookery inspection and investigation will be rendered difficult and dangerous. The handling of the bachelor seals on the killing fields will also be attended with difficulty and danger by

reason of the bulls which will necessarily be taken up in driving. Hauling grounds and breeding grounds will be overrun by a horde of savage, fighting bulls. The herd will go into eclipse and it will be fifteen or twenty years before it emerges from the darkness and begins to show normal conditions again. Its size will then preclude the possibility of counts or accurate estimates to enable those in charge to find a basis of understanding the herd such as we have to-day.

The condition thus warned against is now practically inevitable. The department of commerce, by accepting as "wise and sound legislation" the fur-seal law of 1912 and taking no step towards its repeal or amendment, has deliberately thrown away the opportunity to settle the two important facts vital to the future administration of the fur-seal herd.

GEORGE ARCHIBALD CLARK

STANFORD UNIVERSITY, CALIF.,

September 19, 1916

#### IS DYNAMICS A PHYSICAL SCIENCE?

PROFESSOR HUNTINGTON's latest communication<sup>1</sup> helps to make clear the difference between his method of treating mass and the usual treatment. According to the ordinary view, such problems as the one proposed by me are solved very simply by the principle that *the mass of a body is the sum of the masses of its parts*. Although Professor Huntington does not give a general<sup>2</sup> solution, he indicates that his method also makes use of this principle of additivity, but only after it has been *proved* by an analysis involving internal forces, the law of action and reaction and the law of vector composition of forces. Apparently he is unwilling to assume as fundamental even the fact that the mass of a body is increased by adding matter to it. I have no logical objection to this procedure, but it seems to me to be an unnecessarily difficult method of introducing a very simple principle. It is to be noted, moreover, that the proof of

<sup>1</sup> SCIENCE, September 8, 1916.

<sup>2</sup> The general solution must cover any case whatever in which a body is formed by putting together the material of two bodies; for example, the case of a body formed by fusing together two lumps of metal.

the theorem employed by Professor Huntington involves a physical principle not explicitly stated by him, namely that *matter consists of individual particles, each of which preserves its identity and its mass throughout all physical or chemical changes.*

Those who believe that mechanics should be regarded as a physical science rather than a branch of pure mathematics will probably agree that in elementary instruction it is less important to build up a logical framework than to help the beginner to appreciate the physical meaning of dynamical laws.

L. M. HOSKINS

STANFORD UNIVERSITY,  
September 16, 1916

#### FLASHING OF FIREFLIES

TO THE EDITOR OF SCIENCE: The notes by Mr. Edward S. Morse in SCIENCE for February 4 and September 15, 1916, on fireflies flashing in unison, have been of very great interest to the writer, in connection with his studies of the light-emission of American Lampyridæ,<sup>1</sup> and during the course of these observations he has constantly been on the watch for synchronous flashing of the type reported by Mr. Blair and by Mr. Morse. There seems to be no doubt that it is a fairly frequent, if not a constant, method of light-emission among certain tropical (mainly oriental) Lampyrids, but instances of it in our North American species must be fortuitous, at least in this locality. The writer's observations so far made have been on *Pyroctomena borealis*, *P. lucifera*, *P. angulata*, *Photinus pyralis*, *P. consanguineus*, *P. scintillans*, *P. marginellus*, *P. castus* and *Photuris pennsylvanica*. In most of these there is now no doubt that the photogenic function serves as an attraction between the sexes for mating, and synchronous flashing of a large number of individuals would seem to be of such a nature as to interfere with this function of the light. Among the species studied, there would ap-

pear to be a possibility of anything approaching synchronous flashing only in *Photuris pennsylvanica*, whose lighting habits it has been found difficult to follow accurately. On one or two occasions during the past summer observations were made by Mr. H. S. Barber, of the National Museum, and the writer, of what appeared to be the alternate illumination of adjacent trees in which this species was present in abundance, but it was soon evident that while at a given instant one tree may have been more highly illuminated than the other, there was nothing approaching periodicity in the phenomenon, and no continuation of it was noticed. Of course, special conditions of temperature, moisture, air currents, etc., might influence these insects in such a way as to produce synchronous flashing, but although especially watched for, we have been unable to secure an observation of it. If any other observations of this character have been made on North American species of Lampyrids, the writer would be very glad to hear of them.

In regard to the synchronous head movements of ants, referred to by Mr. Morse as having been reported by Cox, it may be noted that one of our common web-worms exhibits a very similar conduct, a stimulus, such as a shadow passing over the colony, being sufficient to cause all of the caterpillars to jerk the head and forward segments from side to side, the great majority of them to the same side at the same time.

F. ALEX. McDERMOTT

WASHINGTON, D. C.,  
September 20, 1916

#### OCCURRENCE OF YELLOW LEAF RUST OF WHEAT (*PUCCINIA GLUMARUM*) IN THE SALT LAKE VALLEY, UTAH

ON June 23, 1915, the writer and one of his assistants, Mr. W. W. Jones, collected an apparently new rust on wheat in several fields north and west of Ogden, Utah. It was noted that the infection was very serious and in some instances the fields had the appearance of suffering greatly from drouth. A careful examination, however, showed that this condi-

<sup>1</sup> *Canadian Entomologist*, 1910, Vol. 42, p. 357; 1911, Vol. 43, p. 399; 1912, Vol. 44, pp. 73, 309; *Zeitschrift fuer wissenschaftliche Insektenbiologie*, 1914, Vol. 10, p. 303.